



U. S. DEPARTMENT OF AGRICULTURE  
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION  
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FOREST SERVICE

# Research Note

416

Number 142

Portland, Oregon

April 1957

## TIMING OF AERIAL SURVEYS FOR THE BALSAM WOOLLY APHID <sup>1/</sup>

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An outbreak of the balsam woolly aphid (*Chermes piceae* Ratz.) is damaging and killing Pacific silver fir, subalpine fir, and grand fir extensively in western Washington and Oregon. It is most serious in southern Washington where an outbreak on Pacific silver fir was discovered in 1954. Since effective methods for controlling this insect under forest conditions have not yet been developed, all that can now be done to minimize its destruction is to salvage the dead and dying trees. Because of rapid deterioration of dead timber, early detection of infestation is essential to enable logging of affected stands before values are lost.

Faded foliage is the primary indicator relied upon for detecting infestation during aerial surveys. The period when fading caused by chermes becomes most conspicuous had not been determined at the time the aerial survey manual <sup>1/</sup> was prepared. In order to determine this time, seven flights at approximately 25-day intervals were made over the infested areas during the period April 7 to September 18, 1955. An eighth flight was made on December 12 of the same

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<sup>1/</sup> This is a revision of information given in Table 1, page 9, and in paragraph 4, page 10 of "Organization and Conduct of Forest Insect Aerial Surveys in Oregon and Washington" by J. F. Wear and W. J. Buckhorn, Pacific Northwest Forest and Range Experiment Station. March 1955. Multilith Report.

year. Particular attention was given to the appearance of trees at the 2,000-foot and 4,000-foot levels, the lower and upper altitudinal limits of the main infestation.

#### Progress of Foliage Fading from Low to High Elevations

At low elevations (2,000 feet) the first yellowing of new foliage was evident by June 24. It was especially noticeable in the upper crowns. As the season advanced, trees faded progressively up the slopes. By July 25 some yellowing of new foliage, particularly in the upper crowns, was evident at the 4,000-foot elevation. The yellowed foliage soon turned red, then brown. By September 18 at the 2,000-foot level, most of the injured foliage had turned brown, while at the 4,000-foot level most of it had turned red, and on only a few trees had it turned brown.

Most of the colored foliage remained on trees until removed by fall storms which began in September. By December 12, all the discolored foliage had fallen. At that time the defoliated trees and the silvery, gouted branches in the tops of infested living trees were the only signs of infestation.

#### Conclusions

The data obtained in 1955 indicate that aerial surveys to detect balsam woolly aphid infestation should be conducted after foliage has faded sufficiently to become conspicuous, but before the fall storms occur. Regional surveys to be most effective should be postponed until the foliage of infested trees at the higher elevations has faded. In 1955, the optimum period for making a survey of balsam woolly aphid damage in the Pacific silver fir stands of southern Washington was from about August 25 to September 13.

Due to vagaries in weather conditions the period when colored foliage is most conspicuous may vary considerably from year to year. Also it will vary with elevation, latitude, and host tree. During the regional survey of 1956, aerial mapping for chermes in Pacific silver fir stands was done during the period August 21-28 and in subalpine fir stands during the period August 20-21. Detection on these dates was good.

Based on experience in 1955 and 1956, it is concluded that in most years chermes detection surveys from the air should be made during the period from about August 15 to September 15.